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WORLD PHOSPHATE FERTILIZER SUPPLY/DEMAND TRENDS*

Prepared by

Gene Harris**

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** Economist, Outreach Division, International Fertilizer Development Centre, Muscle Shoals, Alabama 35662, USA

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SUMMARY

The paper presents a review of statistical data on the production; supply potential; consumption respective demand; use (consumption per ha); and prices of phosphates, compiled from various sources of world-wide recognition.

The tables comprise averaged regional figures and data on relevant producer/consumer and exporting/importing countries, with an indication of their ranking which changed significantly over the past decade.

Conclusions are drawn on the basis of past trends and projections, taking into account the planned growth of phosphoric acid production capacities. The attention is focussed on the changing pattern of the global supply/demand situation influenced by decreasing consumption growth rates. The increasing share of the developing countries' production and consumption within the respective world totals are highlighted.

Macro-economic problems which have induced a world-wide decline of consumption over the past three years are shown as an important factor of the present trend. The supply/demand outlook presented in the paper reveals a relatively large surplus of phosphate fertilizer availability throughout the next five years, and suggests that this factor is indicative of the development trend of the phosphate fertilizer industry for the nearest future.

WORLD PHOSPHATE FERTILIZER SUPPLY/DEMAND TRENDS[1]

Production

It has not been a good year for most phosphate producers. Prices of most phosphate products have declined while the production costs of inputs such as sulfur have increased substantially. A record 34 million mt of phosphate fertilizers, excluding phosphate rock, was produced in 1983/84[1] (Table 1). Ten years earlier (1973/74) only 25 million mt of phosphate fertilizers was produced. North America was the biggest producing region in both years, producing about 27% of the world's total in 1983/84. Production in Western Europe declined significantly during this period, whereas production in Asia and the U.S.S.R. increased significantly, going from 12% each in 1973/74 to 19% and 18%, respectively, of the world's total in 1983/84. Asia was the region that had the fastest growth in production, increasing at a rate of 8.4% annually. Africa increased at about 5.8% annually. Developed countries as a whole increased production at the annual rate of 1.8% during the past decade while developing countries increased production of phosphates at an annual rate of 9.0%.

Table 1. World: Fertilizer Production by Region, 1973/74 and 1983/84[a]

Area	P_2O_5 (million mt)	% World 1973/74	P_2O_5 (million mt)	% World 1383/84	Annual Compound Growth Rate (%)
North America	6.9	28	9.2	27	2.9
Latin America	0.7	3	1.3	4	5.9
Western Europe	6.4	26	5.1	15	-2.3
Eastern Europe	2.5	10	3.1	9	2.2
U.S.S.R.	3.0	12	6.1	18	7.4
Asia	3.0	12	6.6	19	8.4
Africa	0.9	4	1.7	5	5.8
Oceania	1.6	6	1.0	3	-5.0
TOTAL WORLD	25.0	100	34.0	100	3.1
Developed Countries	21.5	86	25.6	75	1.8
Developing Countries	3.5	14	8.4	25	9.0
TOTAL WORLD	25.0	100	34.0	100	3.1

a. Does not include ground phosphate rock. Calendar year data for 1983 would be included with 1983/84. Totals may not add due to rounding.

Source: FAO.

The United States, U.S.S.R., China, France, and India rank as the top five producers and consumers of phosphate fertilizer. India has replaced Brazil in the top five in both categories during the latest year. The top five countries

1. The primary data source used in this paper is the Food and Agriculture Organization of the United Nations (FAO). The latest year for FAO's published fertilizer statistics is 1983/84.

produced 58% of the 34 million mt of finished phosphate fertilizers (excluding ground phosphate rock used for direct application).

Dwindling worldwide sulfur supplies coupled with increasing demand since 1984 sharply increased sulfur prices, which reached record levels during July 1985 but have declined since then. High sulfur prices have sharply increased the production cost of most phosphate fertilizers. The U.S. Bureau of Mines data indicate that world sulfur consumption exceeded world production by about 3 million mt in 1984. Other analysts indicate that the shortfall may have been even higher. The deficit was met by reducing inventories in Canada. These inventories in 1978 totaled 21 million mt but were reduced 3 million mt last year and now total 12 million mt, some of which may not be available. Sulfur supplies are expected to be tight throughout the 1980s.

Consumption

The political and economic events of the past decade have had a major impact on phosphate consumption. In the 1970s many developed countries designed policies to increase food production, particularly for export. Developing countries reacted to the 1974 food and fertilizer crisis by launching programs to become more self-sufficient in food production. These policies stimulated fertilizer consumption particularly in the late 1970s.

In the 1980s farmers in developed countries achieved record levels of agricultural production, which resulted in low prices at a time when their production costs continued to increase. In order to reduce production costs farmers have maintained past levels of phosphate use or have cut back on use. In developing countries shortages of foreign exchange, high inflation, high interest rates, high military expenditures, low demand for exports from developing countries, balance of payment constraints, high subsidy costs, and growing debt service payments have also made it difficult for the fertilizer sector to develop. These factors have resulted in world phosphate consumption declining in 2 of the past 3 years (1981/82 and 1982/83).

Phosphate fertilizer consumption during the past decade has increased from 24.2 million mt in 1973/74 to 31.8 million mt in 1983/84 for an annual growth rate of only 2.8% (Table 2). The major growth market has been Asia which consumed 16% of the world's total in 1973/74 but now consumes 27%. The U.S.S.R.'s share of consumption has increased from 11% in 1973/74 to 18% in 1983/84. In 1973/74 North America and Western Europe consumed almost one-half of the world's total but now consume less than one-third of the world's total; each region's share of the world's total has declined significantly.

Table 2. Phosphate Fertilizer Consumption by Region, 1973/74 and 1983/84[a]

Area	P_2O_5 (million mt)	% World 1973/74	P_2O_5 (million mt)	% World 1983/84	Annual Compound Growth Rate (%)
North America	5.1	21	5.2	16	0.1
Latin America	1.3	5	1.7	5	2.5
Western Europe	6.0	25	5.1	16	-1.6
Eastern Europe	2.8	12	3.3	10	1.8
U.S.S.R.	2.7	11	5.7	18	7.6
Asia	3.9	16	8.5	27	8.0
Africa	0.7	3	1.1	3	5.1
Oceania	1.6	7	1.1	3	-3.7
TOTAL WORLD	24.2	100	31.8	100	2.8
Developed Countries	19.4	80	21.5	68	1.1
Developing Countries	4.8	20	10.2	32	7.8
TOTAL WORLD	24.2	100	31.8	100	2.8

a. Does not include ground phosphate rock for direct application. Calendar year data for 1983 is included with 1983/84. Totals may not add due to rounding.

Source: FAO.

Ten years ago the developing countries consumed one-fifth of the world's phosphate fertilizers. This share has increased to one-third of the world's total during the 10-year period. Growth rates in the developing countries have been 7.8% annually during the past decade, whereas the growth in developed countries has been only 1.1%. The top five consumer countries were also the top five producers (Table 3). These five countries consume about 53% of the world's phosphate. The U.S.S.R. ranks first in consumption and the United States second in consumption, whereas this order is reversed in the production rankings.

During the past 10 years phosphate use has increased at a slower rate than nitrogen use in both developed and developing countries. In developed countries phosphate use has also increased slower than potash use, but in developing countries phosphate use has increased faster than that of potash.

Use Per Hectare

In phosphate consumption per hectare, seven of the ten highest countries are in Western Europe (Table 4), where consumption averaged 56 kg/ha in 1982 (latest data available). The developed countries as a group consumed about 31 kg/ha of P_2O_5. The average for the world was 21 kg/ha, for Asia 17 kg/ha, and for developing countries 12 kg/ha. Consumption in Africa averaged only 6 kg/ha, considerably below the average for other developing regions.

Trade

The United States is the world's leading exporter of finished phosphate fertilizers followed by Tunisia, Belgium-Luxembourg, Morocco, and the Netherlands

Table 3. World's Top Ten Phosphate Fertilizer Producers, Consumers, and Traders (1983/84)

Country	Production			Consumption			Imports			Exports		
		World Rank			World Rank			World Rank			World Rank	
	1983/84 ('000 mt)	1973/74	1983/84	1983/84 ('000 mt)	1973/74	1983/84	1983/84 ('000 mt)	1973/74	1983/84	1983/84 ('000 mt)	1973/74	1983/84
United States	8,597	1	1	4,472	1	2	109	3	19	3,948	1	1
U.S.S.R.	6,108	2	2	5,683	2	1	121	36	18	312	9	6
China	2,666	4	3	3,671	3	3	1,005	9	1	0	NA	NA
France	1,230	3	4	1,614	4	4	560	1	2	110	7	12
India	1,059	20	5	1,344	10	5	143	5	13	0	NA	NA
Brazil	922	21	6	866	9	7	0	2	NA	56	32	23
Poland	872	NA	7	900	7	6	37	112	39	3	21	41
Romania	733	16	8	537	18	14	0	NA	NA	196	17	8
Canada	655	10	9	713	12	11	151	31	11	94	4	14
Japan	647	9	10	766	8	8	158	19	10	31	22	27
West Germany	552	6	14	745	6	9	355	7	4	149	6	10
Australia	597	5	13	728	5	10	174	85	9	0.3	NA	46
Tunisia	514	26	16	38	61	61	0	NA	NA	485	5	2
Belgium-Lux	515	8	15	97	27	38	62	17	29	480	2	3
Morocco	493	28	17	96	50	39	0.4	NA	119	387	8	4
Netherlands	403	17	21	86	35	43	50	13	34	348	3	5
Korea Rep.	458	30	18	171	24	29	0	16	NA	266	NA	7
Jordan	144	NA	35	7	108	86	5	93	73	170	NA	9
Iran	4	38	63	427	32	17	423	27	3	0	NA	NA
Italy	616	12	12	682	14	12	313	12	5	79	19	19
Hungary	233	25	29	410	20	18	241	6	6	33	NA	26
United Kingdom	317	14	26	462	13	16	191	18	7	49	12	25
Pakistan	92	61	41	258	43	26	180	10	9	0	NA	NA
TOTAL	28,427			21,469			4,278			7,196		
Other countries	5,607			10,286			2,429			988		
World Total	34,034			31,755			6,707			8,184		

Notes: Countries listed are those that were ranked in the top ten in either production, consumption, imports, or exports in 1983/84. Information does not include ground phosphate rock for direct application.

Source: Derived from FAO data.

Table 4. Use of Phosphate[a] Per Hectare, 1982[b]

Africa			Asia			Latin America			Developed Countries		
Rank	Country	kg/ha	Rank	Country	kg/ha	Rank	Country	kg/ha	Rank	Country	kg/ha
1	Egypt	60.6	1	Japan	149.3	1	Cuba	25.4	1	New Zealand	702.1
2	South Africa	37.0	2	Korea Rep.	68.3	2	Uruguay	24.8	2	Iceland	112.5
3	Mauritius	28.8	3	Korea, DPR	57.3	3	Mexico	20.8	3	Ireland	149.4
4	Libya	20.5	4	Lebanon	45.0	4	Costa Rica	20.2	4	Belgium-Lux	113.1
5	Zimbabwe	16.2	5	Israel	37.6	5	El Salvador	17.3	5	Switzerland	106.3
6	Kenya	12.9	6	China	31.6	6	Brazil	16.2	6	Germany FR	99.1
7	Algeria	9.8	7	Iran	29.2	7	Colombia	14.8	7	Czechoslovakia	92.6
8	Morocco	9.6	8	Saudi Arabia	29.2	8	Venezuela	12.6	8	Netherlands	89.9
9	Tunisia	8.0	9	Malaysia	25.6	9	Panama	11.0	9	France	87.6
10	Mozambique	4.2	10	Turkey	20.7	10	Guatemala	10.1	10	Bulgaria	87.0
11	Zambia	3.6	11	Indonesia	18.2	11	Chile	8.1	11	Norway	77.9
12	Malawi	2.2	12	Cyprus	15.1	12	Ecuador	7.0	12	Hungary	73.9
13	Ghana	2.0	13	Bangladesh	14.3	13	Nicaragua	5.1	13	Finland	67.8
14	Nigeria	1.9	14	Sri Lanka	14.1	14	Dominican Republic	4.6	14	United Kingdom	66.5
15	Senegal	1.8	15	Pakistan	13.1	15	Peru	3.6	15	Germany DR	60.8
16	Ivory Coast	1.8	16	Syria	9.5	16	Honduras	1.5	16	Poland	55.6
17	Ethiopia	1.5	17	India	7.1	17	Argentina	1.4	17	Italy	52.9
18	Cameroon	.7	18	Thailand	6.9				18	Romania	51.8
19	Tanzania	.5	19	Vietnam	6.3				19	Austria	51.0
20	Sudan	0.0	20	Philippines	4.3				20	Greece	44.9
			21	Burma	4.3				21	Denmark	42.8
			22	Nepal	3.5				22	Albania	40.9
			23	Iraq	2.2				23	Sweden	38.6
			24	Afghanistan	1.8				24	Yugoslavia	30.0
									25	U.S.S.R.	26.3
									26	Portugal	22.2
									27	Spain	20.6
									28	United States	19.8
									29	Australia	15.5
									30	Canada	14.1

a. Includes countries using 20,000 nutrient tons or more.
b. Per hectare of arable land and land in permanent crops.

Source: 1983 FAO Fertilizer Yearbook (latest available).

(Table 3). During the past 10 years Morocco has replaced Canada in this elite group; the other four countries were among the top five exporters in 1973/74. The United States exports almost one-half of the world's phosphate fertilizers. The top five countries export 69% of the world's total. About 8 million mt of phosphate was exported in 1983/84 by all countries. China was the largest importer of phosphate fertilizers followed by France, Iran, West Germany, and Italy. These five countries account for about 40% of the world's phosphate imports. France is the only one of these countries that ranked in the top five in 1973/74; the other four were Brazil, United States, Turkey, and India.

Prices

Figure 1 shows weekly international prices of TSP, f.o.b., U.S. Gulf. Triple superphosphate prices increased from 1978 through early 1981 and reached a high of $196/mt in March 1980; they then retreated and again advanced in early 1981, reaching a new high of $206/mt in February 1981. In July 1985, they declined to $110/mt. As TSP prices were declining prior to July, sulfur prices were increasing, reaching a high of $152/mt f.o.b. Vancouver in July. This has caused a number of phosphate producers in the United States to temporarily cut back their operations. Diammonium phosphate prices (DAP) have fluctuated somewhat similarly to those of TSP, reaching a high of $260/mt in January 1980 and then declining and reaching a 5-year low of $158/mt in July 1985. Prices have increased since then.

Supply/Demand Outlook

In trying to forecast the phosphate fertilizer situation, let us look at the future supply first. North America has, by far, the largest amount of phosphoric acid capacity with about 11.7 million mt of the world's total of 33.5 million mt in 1985 (Table 5). Africa is expected to increase its capacity from 4.1 million mt in 1985 to about 6.2 million mt in 1990 which will exceed considerably the increases expected in other regions. Countries projected to make the largest increases in phosphoric acid capacity during the next 5 years include Morocco, U.S.S.R., Tunisia, Mexico, and Brazil (Table 6). A 10% increase in phosphoric acid capacity worldwide is expected between 1985 and 1990, slightly lower than the projected growth in ammonia capacity. On the basis of preliminary supply/demand projections prepared by the FAO/UNIDO/World Bank Working Group on fertilizers in June 1985, wor fertilizer consumption is expected to reach 152.9 million mt of plant nutrients in 1989/9 compared with 129.3 million mt estimated for 1984/85.

Table 5. World Phosphoric Acid Capacity by Region, 1970-90 Projected

	1970	1976	1980	1985	1990	Change 1985-90
	(million mt P_2O_5)					
North America	6.4	9.2	10.4	11.7	10.8	-.9
Latin America	0.6	0.7	0.8	1.2	1.9	0.7
Western Europe	3.5	4.7	4.6	4.3	4.4	0.1
Eastern Europe	0.5	1.4	1.9	2.1	2.3	0.2
U.S.S.R.	0.9	2.4	3.2	5.4	6.2	0.8
Africa	0.7	1.6	2.7	4.1	6.2	2.1
Asia	1.3	2.2	2.9	4.4	4.7	0.3
Oceania	0.2	0.2	0.2	0.3	0.3	0.0
WORLD TOTAL	14.1	22.4	26.7	33.5	36.8	3.3

Source: TVA, September 6, 1985.

The Working Group's projections indicate that phosphate consumption will increase from 34.0 million mt of P_2O_5 in 1984/85 to 40.2 million mt of P_2O_5 by 1989/90[2] (Figure 2). This would be a growth of about 3.5% annually. About 55% of the projected growth is expected to occur in developing countries. The available phosphate supply is projected to increase from 37.4 million mt of P_2O_5 in 1984/85 and reach 42.6 million mt of P_2O_5 in 1989/90. Over two-thirds of this growth will be in North Africa and other developing countries. These projections indicate a large surplus of phosphate fertilizers throughout the next 5 years.

Summary

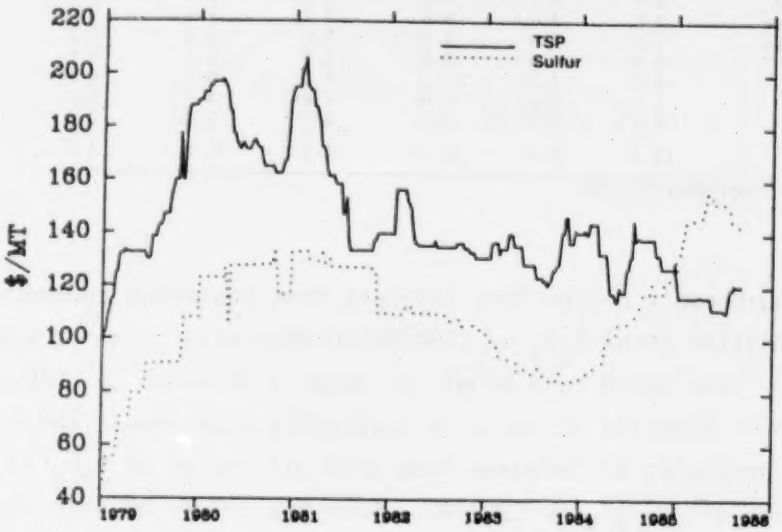
Phosphate production during the past 10 years has increased at a rate of 3.1% annually. Increases in sulfur prices and declines in prices of phosphate products have made 1985 a bad year for most producers. Five countries produce 58% of the phosphates, and five countries account for 69% of the world's exports. Asia and the U.S.S.R. have increased in importance as producing and consuming regions during the past decade while Western Europe's importance has declined.

A worldwide recession and low farm commodity prices, high interest rates, and foreign exchange problems have reduced the demand for phosphate fertilizers. As a result, phosphate consumption worldwide has declined during 2 of the past 3 years. During the past 10 years, growth in consumption has averaged only 2.8% annually.

A surplus of phosphates is projected for the next 5 years. The biggest increases in phosphoric acid capacity are projected for Morocco, U.S.S.R., and Tunisia.

2. Projections include phosphate rock used for direct application.

Figure 1. Sulfur and TSP Prices.



Source: Green Markets

Sulfur f.o.b. Vancover
TSP f.o.b. U.S. Gulf

Figure 2. World Total P_2O_5 Fertilizer Supply and Demand (Includes Ground Phosphate Rock).

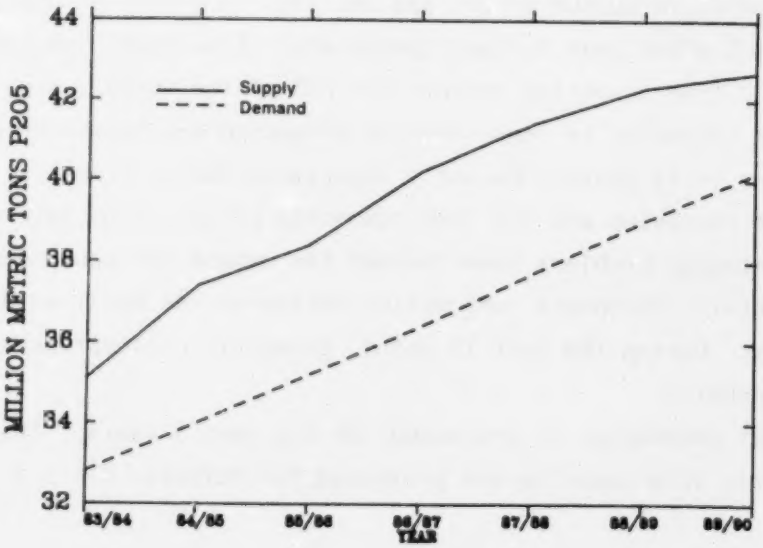


Table 6. Ten Countries With Largest Announced Increases in Phosphoric Acid Capacity, 1985-90 Projected

Rank	Country	1985	1990	Increase	% Increase
		('000 mt P_2O_5)			
1	Morocco	1,485	2,805	1,320	89
2	U.S.S.R.	5,379	6,194	815	15
3	Tunisia	1,125	1,690	565	50
4	Mexico	546	942	396	73
5	Brazil	667	982	315	47
6	Indonesia	180	360	180	100
7	Algeria	165	330	165	100
8	Poland	496	639	143	29
9	Yugoslavia	740	835	95	13
10	Sweden	170	220	50	29
TOTAL OTHER		22,594	21,954	-640	-3
TOTAL WORLD		33,544	36,951	3,407	10

Source: TVA, September 6, 1985.

References

Bureau of Mines, U.S. Department of the Interior. 1985. Mineral Commodity Summaries 1985.

Food and Agriculture Organization of the United Nations (FAO). 1983. Fertilizer Yearbook, 1984, Rome.

Food and Agriculture Organization of the United Nations (FAO). 1983. Production Yearbook, 1984, Rome.

Food and Agriculture Organization of the United Nations (FAO). Current World Fertilizer Situation and Outlook 1982/83-1988/89, 1984, Rome.

Harris, Gene. 1985. Africa Fertilizer Situation, International Fertilizer Development Center, Muscle Shoals, Alabama.

Harris, Gene. 1985. Asia Fertilizer Situation, International Fertilizer Development Center, Muscle Shoals, Alabama.

Harris, Gene. 1985. Fertilizer Situation in Developed Countries, International Fertilizer Development Center, Muscle Shoals, Alabama.

Harris, Gene. 1985. Latin America Fertilizer Situation, International Fertilizer Development Center, Muscle Shoals, Alabama.

Harris, Gene. 1985. World Fertilizer Supply and Demand in Perspective, IFDC training paper, October 1985.

McGraw Hill, Inc., Green Markets, selected issues.

Stangel, Paul J., and Gene Harris. 1985. Trends in Production Trade and Use of Fertilizers: A Global Perspective, Paper presented at Workshop on Fertilizer Efficiency, Griffith, Australia, April 13-15, 1985.

Stangel, Paul J., and Gene Harris. 1985. Trends in the Production Trade and Use of Phosphate and Potash Fertilizers: A Global Perspective, Paper presented at Economic Commission for Europe, May 13-17, 1985.

Tennessee Valley Authority, Unpublished data on Phosphoric Acid Capacity.

World Bank/UNIDO/FAO Fertilizer Working Group. 1985, unpublished data.